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COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

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Abstract

Resistance training at the youth level can be beneficial if implemented correctly. Resistance training has been shown to be linked to better cardiovascular, bone health, psychosocial health and well-being, motor performance and sports performance, and reduce sports-related injuries (Zwolski, Yates, & Paterno, 2017). Faigenbaum (2010) listed five myths about youth resistance training. Despite being myths, many coaches are still hesitant to implement resistance training into youth programs. The goal of this study is to investigate the perceptions that coaches in the high school setting have on Faigenbaum's myths and the National Strength and Conditioning Association (NSCA) guidelines. A quantitative study was administered using a 16-item questionnaire via Qualtrics. A recruitment email was sent out to a total of 680 high school coaches. This included head and assistant coaches. About 11% responded and 10% were usable.

Results show that seven (11.29%) participants strongly disagree that resistance training is unsafe for 7-10 year olds, thirteen (20.97%) strongly disagree that resistance training is unsafe for 11-14 year olds, and thirty (48.39%) strongly disagree that resistance training is unsafe for 15-18 year olds. Results indicate that no one strongly disagreed with the resistance training guidelines set forth by the NSCA. The guideline with the lowest mean and standard deviation was "Should have a exercise environment that is safe and free of hazards" (M-1.19 SD-.40). Most coaches understand the need for the specific guidelines and safety precautions, but there is still a lack of understanding when it comes to the benefits of resistance training for younger participants.

Introduction

Resistance training in youth athletes has contributed to strength gains of 20 to 40 percent in a short amount of time when implemented correctly (Faigenbaum, 2002). Resistance training is a specialized technique of strength and conditioning that is used all over the world by athletes. The athletes that are utilizing this technique and program are individuals who are competing at all different levels and all different types of sports. While some youth athletes are adding in types and parts of resistance training to their routines, resistance training is still not being utilized in the youth athletics enough or correctly. Implementing this technique can allow for gains of strength, muscle size and anaerobic endurance (.

The concept of resistance training is often confusing and difficult to understand. Simply put, resistance training programs require muscles to contract against an external source. Individuals can use weight machines, free weights, elastic bands, medicine balls and/or plyometric to achieve these benefits. Another great tool that can be used in order to perform resistance training exercise is body weight (i.e. push-up) which is simple and free of cost. In addition, this type of resistive load requires different movement velocities (Faigenbaum & Myer, 2010). Different movement velocities include different specified loads and a different number of repetitions. For most individuals seeking interest in resistance training, the idea or concept of movement velocity can be intimidating. The concept and equipment involved can be especially discouraging to parents as well as children and adolescents.

Children and adolescents in this research paper are specifically referred to as individuals between the ages of 7 and 18. Many research articles and studies use the Tanner stages developed by Professor James M Tanner. Stage 1 is considered prepubertal, stages 1-2 is late

childhood/prepubertal, stages 3-4 is adolescents/pubertal, and lastly, stage 5 is adulthood/post-pubertal (Granacher et. al., 2016). The Tanner stages is a great way for researchers to stay on track and stay consistent with other literature. While this is the standard protocol for differentiating puberty and maturation, there are other terms to be familiar with. In existing literature, "children

represents girls and boys (generally up to the age of 11 and 13 years, respectively) who have not developed secondary sex characteristics" and "girls 12 to 18 years and boys 14 to 18 years are generally considered adolescents" (Zwolski, Quatman-Yates, & Paterno, p. 437, 2017). These terms are very important to understand when it comes to choosing exercises within the resistance training program.

Athletes are constantly and consistently looking for ways to become better and stronger (Myer & Wall, 2006). Even in youth sports, parents, coaches, and professionals are implementing different techniques in order to better their teams. Research is conducted and the topic is examined because of the need and desire to become the best athlete. The challenge lies when the parents and athletes, especially children and adolescents, do not take time to investigate and review the literature on the techniques. There is no doubt that parents want to keep their children and adolescents safe and healthy. As a result, parents seem to hesitate when allowing their young athletes to take part in resistance training activities. Parents of youth athletes only believe what they have always been told or heard from others. While parents are uninformed of the benefits of resistance training, our youth coaches may be as well. Unfortunately, there is a great lack of understanding by individuals who are supervising and implementing these programs. If our head and assistant coaches are fully educated on the benefits of resistance

training, then we can pass that information down to our parents of these youth athletes to ensure an all-around better understanding.

There are many different benefits that a child or adolescent can receive if a resistance training program is implemented carefully. Young athletes participating in sport or seeking a specific skill need to focus on their cardiovascular and musculoskeletal health (Faigenbaum, 2002). The strength and conditioning technique will also help these young athletes become better at specific skills and their overall sport. Resistance training will allow these young athletes to stay physically active, as they become young adults (Faigenbaum, 2002). This type of training most importantly can decrease obesity and allows children and adolescents to live healthy lifestyles (Faigenbaum et al., 2009). In addition, with the prevalence of obesity at its highest, implementing this program could possibly decrease obesity as a whole (Sigal et al., 2017). Benefits include a better cardiovascular, bone health, psychosocial health and well-being, motor performance skills and sports performance, and can potentially reduce sports-related injuries. Resistance training has actually been proven to contribute to the prevention of injury (Zwolski, Yates, & Paterno, 2017). If there is a way to make our children and adolescents better athletes and overall healthier, then we as a society, coaches, and parents should take the opportunity. The reason for injuries and high risks during resistance training is due to the lack of research and effort put forth into learning about the technique. Parents, coaches, and other professionals should care and should put forth the effort to learn how to implement a safe and effective paradigm. This will allow the children and adolescents participating in athletics an advantage over individuals who do not take part in the program.

The overall goal of youth sports is to allow our children and adolescents to grow as an athlete and human at a healthy and safe rate. Coaches working in the field need to be able to provide the tools and knowledge to achieve this goal efficiently. Even after over 25 years of research on this topic, there is still debate and hesitation happening. Not implementing resistance training into youth athlete's routines is, in reality, withholding our young athletes from the successful athlete they can be. The aim of this research study is to investigate the knowledge of head and assistant high school coaches on youth resistance training. The goal is to prove that resistance training can be advantageous and safe for the youth athlete population with proper and safe implementation through existing literature. This study will have two important sections. The first part will utilize five myths about resistance training to find out if high school coaches believe them to be true. The second part will utilize the youth resistance training guidelines set forth by the National Strength and Conditioning Association (NSCA) to examine the perception the youth coaches have on the guidelines. The hypothesis for this study is that head and assistant high school coaches will believe that the majority of the myths are true when it comes to 7-14 year old's but not 15-18 year old's. If this hypothesis is correct, the coaches will display a misunderstanding of youth resistance training. In addition, the author of this study believes that at least 80% of the coaches will agree with each guideline.

Theoretical Framework

The history of this topic can be dated back over 25 years ago. Kraemer, Fry, Frykman, Conroy, and Hoffman (1989) were the first to challenge the idea that resistance training within the youth population was unsafe and ineffective. In 1989, they investigated "an exercise prescription paradigm, and examine[d] some of the concerns when prescribing exercise for

prepubescent and post pubescent children" (p. 337). The design provided a paradigm that included lighter loads for children compared to adults, lengthier programs, and appropriate as well as qualified supervision. The authors of this study stated that "it is our hope that this type of review will stimulate a more sophisticated understanding and perspective concerning resistance training in youth and also help stimulate research that can bridge the gaps in our understanding" (Kraemer et al., p. 337, 1989). The research and articles conducted today still have the same hope as these authors in 1989. After this article was published, there was an increase in resistance training at the youth level. However, many researchers and professionals had concerns regarding the safety and risks of resistance training (Faigenbaum, Lloyd, & Myer, 2013).

As a result of the concerns, researchers and professionals were motivated to look more deeply into the topic at hand. This allowed for an expansion of literature and understanding. As the literature specific to this topic grew, the NSCA updated their position statement regarding youth resistance training. This took place in 2009 and was based off a study performed from 2005-2006. This organization reviewed the literature from the past and current. This includes the effectiveness of resistance training, the persistence of strength gains, physiological aspects, and health benefits (Faigenbaum et al., 2009). They concluded with guideline recommendations, and stated that,

> despite outdated concerns regarding the safety or effectiveness of youth resistance training, scientific evidence and clinical impressions indicate that youth resistance training has the potential to offer observable health and fitness value to children and adolescents, provided that appropriate training guidelines are followed and qualified instruction is available (Faigenbaum et al., p. 73, 2009).

After the NSCA came out with updated their position statement, the World Health Organization noticed and decided to implement the idea of resistance training in their recommendations in 2011. According to the *Global Strategy on Diet, Physical Activity and Health* page, the recommendation for children and adolescents from the ages of 5 to 17 years is that "most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone*, at least 3 times per week" (WHO, para 2, 2011). This means that the public now has the recommendations to allow youth athletes to implement programs, such as resistance training, to gain strength. Literature especially expanded during the 2000 to 2013 era. This was a time where professionals wanted to create designs and guidelines to combat any risks and safety concerns that were being seen (Faigenbaum, Lloyd, & Myer, 2013). The extremely successful researcher and professor at the University of New Jersey, Avery Faigenbaum specializes in "pediatric exercise science, resistance exercise, and preventive medicine" (TCNJ, para 2, ND). Dr. Faigenbaum has

> co-authored over 200 peer-reviewed publications, 40 book chapters and 10 books including Youth Strength Training, Strength and Power for Young Athletes, and Progressive Plyometrics for Kids. Dr. Faigenbaum has been lead or co-author on several position statement papers on youth resistance training (TCNJ, para 3, ND).

His research really took off in the 2000s and helped contribute to a large amount of research of resistance training being done by the year of 2013.

The overall benefits certainly overpower the risks and safety concerns. When the proper steps and guidelines are followed appropriately, individuals taking part in resistance training will see positive results (Faigenbaum & Myer, 2010). According to a recent article written in 2017,

"there is a growing recognition that a foundational set of movement skills should be mastered during childhood to facilitate the potential for long-term engagement and confidence in physical activity" (Zwolski, Quatman-Yates, & Paterno, p. 436, 2017). This is best described as physical literacy. To adopt physical literacy as a child or adolescent will allow them to grow into a physically active adult. Not only is there an overall lifelong benefit of resistance training but there are many short-term or specific benefits as well. Other benefits include decreasing the likelihood of obesity, an increase in soft tissue strength, a decrease of sport-related injuries, and muscular fitness. While research has continued to prove these benefits true, there are still many myths out there. Dr. Faigenbaum hits those myths in a one-page report. The top five myths according to Dr. Faigenbaum are:

Myth #1: Strength training will stunt the growth of children

Myth #2: Strength training is unsafe for children

Myth #3: Children cannot increase strength because they do not have enough testosterone

Myth #4: Strength training is only for young athletes

Myth #5: The sport of weightlifting is inappropriate for children (Faigenbaum, p. 1-2, 2010)

As a result of these myths, parents, coaches and many times professionals do not implement resistance training into their youth programs. In the next several paragraphs, the goal is to use the review of the literature to prove these myths wrong and show the benefits of resistance training in youth athletes.

Myth #1: Strength Training Will Stunt the Growth of Children

The first myth states that children and adolescents participating in resistance training will stunt their growth. When working with youth athletes, the obvious concern is their growth plates and keeping them healthy. However, growth plates are only in danger when the athlete is not performing exercises correctly. An article written in 2009 looked at all emergency room patients who were categorized under "weightlifting" from 2002 to 2003. The results showed that the age group of 8-13 and 14-18 had a significantly greater chance of an accidental injury than the individuals above the age of 18. According to the same article, "clinicians once considered open growth plates in a child as a contraindication to resistance training because of a potential, perceived risk of injury to these growth plates" (Myer, Quatman, Khoury, Wall & Hewett, p. 2054, 2009). However, literature now suggests, "the measured benefits from resistance training are now considered to be greater than those attributable to normal growth and development in children and adolescents" (Myer et al., p. 2057, 2009).

A more current article that was written in 2016 was able to specifically investigate the adaptive process of the skeletal process. They found that resistance training has been shown in current and relevant literature to benefit youth athletes and does not compromise their immature skeletons. According to these authors,

> a higher bone strength index compared with non-athletic controls was also found at the distal and proximal tibia of track- and field athletes, and at the distal radius of female water polo players, aged 11-16 years (54). This difference in bone properties is due to loading and not caused by characteristics of a preselected study population (Legerlotz, Marzilger, Bohm, & Arampatzis, p. 510, 2016).

They also looked at youth male soccer players, youth gymnasts, youth tennis players, and youth female volleyball players all participating in different types aa well as different lengths of resistance training programs. All of these observations came to the same conclusion emphasizing that resistance training can be beneficial to the growth of the youth athletes. The authors mention that there is still a gap in the literature on this topic because of the gender differences found. They stated,

> however, it should be pointed out that most studies examining skeletal changes in adolescents were conducted in females. While skeletal changes in boys can be expected to be similar, time-course and scale could be different. This gap in the literature should therefore be addressed (Legerlotz et al., p. 512, 2016).

While there still needs to be research conducted on gender differences, we can conclude that no matter the gender there are a variety of benefits. In addition, from the current literature, there should not be a concern about growth plates or stunting a child or adolescent's growth. In reality, the younger population should be less worried about non-accidental injuries and more focused on safety precautions and following the proper guidelines.

Myth #2: Strength Training is Unsafe for Children

The second myth states that resistance training is unsafe for children and adolescents. Recent research has shown that there are many ways that coaches, parents, professionals, and youth athletes themselves can decrease safety concerns. Resistance training has been increasingly implemented within strength and conditioning programs for youth athletes all over the world. As these programs are becoming more common and used worldwide, the proper guidelines and safety precautions need to be known and followed. Head and assistant high school

coaches are becoming more involved with the programs and the youth fitness environment. With the topic of resistance training being debated within youth athletics for decades, the knowledge of the specific program needs to become more advanced. It is extremely important for professionals, such as coaches, athletic trainers, and strength and conditioning coaches to understand how to implement resistance training properly. Professionals then can educate parents and other individuals involved in the workouts to become more aware of the safety precautions and guidelines. This includes the ability to keep the athletes safe and healthy physically and mentally.

Understanding the young body can help promote a safe workout. When it comes to developing a resistance training program, knowing the training age of the youth athlete is important. Training age is "the length of time the child has been resistance training" and can alter how one may progress through the program (Baechle & Earle, p. 143, 2008). Since the experience and maturity age may differ between the youth athletes, professionals and instructors should cater to the specific needs of the athlete. Developing individualized programs will help better the quality of instruction and progression through the program (Baechle & Earle, 2008). In addition, young athletes will go through a phase of peak height velocity. During this time, muscles and tendons tighten, bone grows stronger, and muscle imbalances may occur (Baechle & Earle, 2008). Individuals in the supervision position should be open-minded and be able to listen and identify the signs of injuries, such as overuse injuries. An article that discussed adolescent boy athletes and how they adapt to short-term resistance training states that,

> it is important to consider that PHV [peak height velocity] can also coincide with higher susceptibility to traumatic and overuse injuries because of joint stiffness, impaired motor

> coordination and a differential in the ratio of limb growth to muscle strength (Moran Sandercock, G. R. H., Ramírez-Campillo, R., Meylan, C., Collison, J., & Parry., p. 1046, 2017).

From this article, we can see how resistance training, if not done correctly, can be detrimental to the young body. Coaches, parents, professionals who are working with the athletes need to have a feasible understanding of when to implement resistance training. If they understand that the results of resistance training are best during and after PHV than they can prevent the unsafe environment (Moran et al., 2017).

Appropriately implementing resistance training to youth athlete's regimen's will allow them to become a more skillful and healthy athlete. To do so, the Pediatric Resistance Training Guidelines can be followed (Barbieri & Zaccagni, 2013). This allows young athletes to create a resistance training program that is specific to their age. The Pediatric Resistance Training Guidelines does a wonderful job targeting all age groups who are mentally and physically ready to start resistance training. The authors create a list of guidelines by using fitness integration. The most important factor about these guidelines is there should always be a supervisor with the adolescent (Faigenbaum & Myer, 2010). This allows for proper technique and guidance. Each set of guidelines is created to achieve a specific benefit or multiple benefits. Youth athletes who are more experienced can utilize high-velocity resistance training. It is noted in one study that high-velocity resistance training in combination with regular soccer training is safe and beneficial (Negra, Chaabene, Hammami, Hachana & Granacher, 2016). The following table was taken from the NSCA Position Statement. Faigenbaum, Kraemer, Blimkie, Jeffreys, Micheli, Nitka,

and Rowland (2009) created these specific guidelines to combat the possibility of an unsafe environment that youth athletes may encounter (p. S70)

• Provide qualified instruction and supervision
• Ensure the exercise environment is safe and free of hazards
• Start each training session with a 5- to 10-minute dynamic warm-up period
• Begin with relatively light loads and always focus on the correct exercise technique
• Perform 1–3 sets of 6–15 repetitions on a variety of upper- and lower-body strength exercises
• Include specific exercises that strengthen the abdominal and lower back region
• Focus on symmetrical muscular development and appropriate muscle balance around joints
• Perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises
• Sensibly progress the training program depending on needs, goals, and abilities
• Increase the resistance gradually (5–10%) as strength improves
• Cool-down with less intense calisthenics and static stretching
• Listen to individual needs and concerns throughout each session
• Begin resistance training 2–3 times per week on nonconsecutive days
• Use individualized workout logs to monitor progress
• Keep the program fresh and challenging by systematically varying the training program
• Optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep
• Support and encouragement from instructors and parents will help maintain interest

This table above is used in this study to investigate the perception of youth coaches and which guidelines they strongly agree or disagree with. It is expected that the majority of youth coaches will strongly agree that there should be a supervisor during resistance training and the environment should be safe and harmless. However, coaches may not strongly agree with the more specific guidelines, even if they are provided by professionals and proved through research by the NSCA.

Myth #3: Children Cannot Increase Strength Because They Do Not Have Enough Testosterone

Myth #3 has been a thought on many people's minds when it comes to youth athletes participating in resistance training. While it might not be a safety concern or health issue, if this was true, young athletes would be wasting their time on resistance training. In addition, many times, parents keep their child or adolescent from building strength because of this assumption.

However, there are different ways to build strength other than by using testosterone. Women are consistently gaining muscle and strength with lower levels of testosterone than males. According to a group of colleagues who examined high-velocity resistance training,

> there is evidence in the literature that training-induced gains in muscular strength in children are primarily caused by neural (i.e., improved intramuscular and intermuscular coordination) rather than muscular factors (i.e., muscle hypertrophy) because of a lack of circulating anabolic hormones (testosterone) (Negra et al., p. 3291, 2016).

Using the neural system can allow youth athletes to build and gain strength without the amount of testosterone that adult males have. Another simple way that youth athlete's bodies adapt to low testosterone is by breaking down the food they ingest and using the nutrients to achieve the strength. Protein can help young athletes participating in resistance training to build muscle. However, building muscle should not be the only goal. Children and adolescents will learn how to stay physically active, proper technique, and motor skills during these programs. Even though building muscle is important, resistance training can teach life skills and has benefits that young children might not get elsewhere.

Myth #4: Strength Training is Only for Young Athletes

This research study is solely focused on youth athletes. However, what children and adolescents, athletes or not, do when training will follow them into their adulthood. Adults, ages 18 or above can utilize resistance/strength training to also gain the same benefits. For example, youth athletes, as well as collegiate, and professional athletes are always competing against injuries. This means, being able to control the likelihood of injuries in sports is very crucial. When there is participation in sport, there is a chance of injury. However, there are many ways

that youth can increase the likelihood of injuries as well as decrease. Injuries are more common to occur when the individual is unfit or at the start of the season when they are not prepared. Research presented in the article written in 2010 showed that girls improved strength at a healthy but fast rate, and with this training, girls could decrease the chance of biomechanics injury (Faigenbaum & Myer, 2010). The authors, Negra, Chaabene, Hammami, Hachana and Granacher (2016) stated that "several scientific reviews and position articles revealed that resistance training (RT) represents a safe and feasible means in healthy children to enhance muscular strength and motor skills and to prevent sport injuries" (p. 3290). Increase muscle strength and motor skill can also pertain to adult athletes who are performing resistance training.

Another benefit that children and adolescents, athlete or not, can gain from resistance training is muscular fitness and complete weight control. Resistance training can improve their overall health as well as decrease the likelihood of obesity. It has been shown that if children and adolescents start resistance training at a young age, they will continue to be active and exercise, as they become adults. This type of training most importantly can decrease obesity and allows children and adolescents to live healthy lifestyles (Faigenbaum et al., 2009). In addition, with the prevalence of obesity at its highest, implementing this program could possibly decrease obesity as a whole. A group of researchers in 2017 conducted a study noted in the article that,

> resistance exercise training might be a more viable alternative for youth with obesity for several reasons. Individuals with obesity have a higher fat-free mass (Browning & Evans 2014), which may lead to more rapid gains in strength, which in turn, may lead to enhancements in emotional and physical well-being, but few pertinent exercise trials exist (Sigal et al., p. 362, 2017).

Since there has only been a few studies or trials on the relationship of resistance training and obesity, many people are hesitant to implement it into their child's life. However, from the few studies done, we have seen great improvement from obese children and adolescents who take part in resistance training (Sigal et al., 2017). To conclude, children and adolescents do not have to be athletes in order to participate in resistance training. There are many benefits, including decreasing injuries (work or school related) and decreasing the likelihood of obesity in which non-athletes can also gain from resistance training. Adults who are not athletes can use resistance training as a leisure activity to gain the potential benefits.

Myth #5: The Sport of Weightlifting is Inappropriate for Children

Weightlifting can be distinguished from the idea of resistance training by fully understanding the definitions of the two. Weightlifting is the act of lifting the maximal amount of weight during competition. The last myth can be derived from wrongly identifying specific activities like weightlifting or resistance training. Many times, athletes are poorly performing and executing the weightlifting event. As a society, the only lifting that is seen and remembered is the 200 plus pound individual who performs weightlifting with no proper guidelines or technique. This usually leads to some sort of injury, and many times the injury is traumatic or career ending. Weightlifting can actually be used as a tool within a resistance training program. Weightlifting, if done correctly and safely can provide a youth athlete with all of the benefits in a resistance training program as discussed above. An article was written by Simon Harries, David Lubans, and Robin Callister (2012) mentioned,

> two studies with elite adolescent weightlifters reported significant increases in squat, clean and jerk, and snatch performances after participation in a 10-week RT program. In

> individual sports such as swimming, sprinting or weightlifting where improvements in performance can be easily quantified, researchers can justifiably conclude that their intervention improved sporting performance (p. 538).

They also showed that individuals on sports teams that used other tactics were more difficult to measure sports performance than ones who performed weightlifting. This means that resistance training, strength training, and/or weightlifting "significantly improves running, jumping, and throwing performance in children and adolescents" (Harries, Lubans & Callister, p. 538, 2012). These findings mentioned above help combat the misconception of weight lifting at the youth level.

Methods

Participants

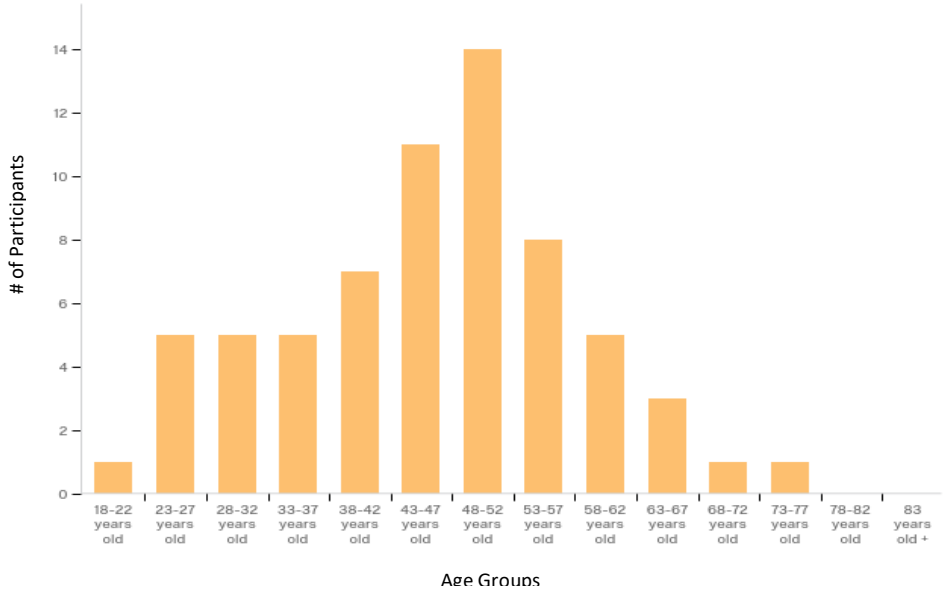
A recruitment email was sent out to a total of 680 high school coaches. This included head and assistant coaches around the area. Sixty-seven of the 680 emails were sent back as rejected or undelivered, due to no longer coaching in the school district or security reasons. About 11% responded and 66 were usable for the demographics section while only 62 completed the survey.

Participants in this study included fifty-two males accounting for 78.9% and fourteen females, accounting for 21.21% of the total participants. Of the 66 participants, fifty-six (84.85%) identified as white, one (1.52%) identified as Hispanic or Latino, and nine (13.64%) identified as Black or African American. All participants have an education of a high school diploma or higher with, three (4.55%) only having a GED, three (4.55%) having trade, technical or vocational training, seven (10.61%) completed an Associate degree, twenty-three (34.85%)

completed their Bachelor's degree, twenty-nine (43.94%) having their Master's degree and one (1.52%) has a professional degree.

Split almost down the middle, thirty-two (48.48%) participants have had strength and conditioning training while thirty-four (51.52%) have not had any previous training. 77.27% of the total participants are paid head coaches, 21.21% are paid assistant coaches and 1.52% is an unpaid assistant coach. Thirty-one (46.97%) participants are full-time coaches, while thirty-five (53.03%) are part-time coaches. Twenty-four (36.36%) participants have been coaching for 21 or more years, eleven (16.67%) 16-20 years of coaching, fourteen (21.21%) 11-15 years of coaching, eight (12.12%) 6-10 years of coaching and nine (13.64%) have coached for 1-5 years. The sports with the most coaches included football with nineteen (19.39%), seventeen (17.35%) baseball coaches and fourteen (14.29%) softball coaches.

Figure 1: Age of Participants



This chart (Figure 1) depicts the age of the participants within this research study.

Procedure

Shortly after the approval from the Institutional Review Board (IRB) at Bowling Green State University, an email was sent out to the prospective participants. In an effort to better understand the perceptions and common practices among youth athlete coaches, a quantitative study was administered to head and assistant coaches around the area. Email addresses of head and assistant high school coaches were collected through colleagues and publicly accessible athletic websites. After allowing coaches two weeks to complete the questionnaire, two reminder emails were sent out. The coaches then had two weeks to complete before the results were collected. The email sent to the potential participants explained the purpose of the study and the ability for the recipient to disregard the email, as they feel necessary. Also included was a link that would direct the participant to the survey. The informed consent form was attached to the beginning of the survey. No incentives were used and confidentiality was assured to participants. The participants then had the ability to choose to consent, which allowed them to begin the survey or reject consent and not begin.

Once the participant consents, the survey begins. A 16-question questionnaire (Appendix A) through Qualtrics was designed based upon existing scholarly research about youth resistance training. The survey included but was not limited to, demographic or background questions such as age, special training, and position, how long as a youth coach and what sports they coach. After the demographic questions, a 7-point Likert scale was used to measure the perception youth coaches have on Faigenbaum's (2010) five myths discussed in the theoretical framework of this paper. All but one myth is divided into three age groups, 7-10 year old's, 11-14 year old's and 15-18 year old's. After the myth section, a 7-point Likert scale is used to measure the

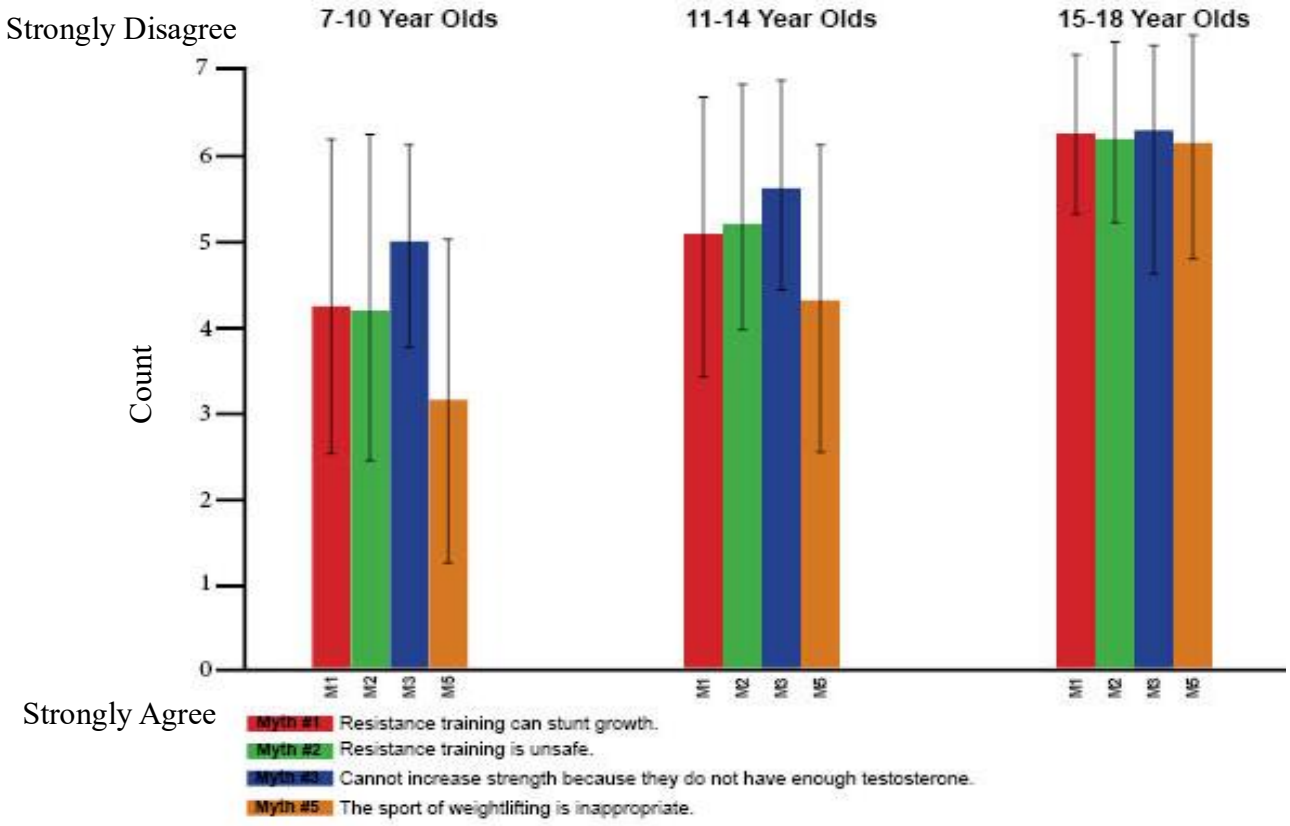
perception and knowledge youth coaches have about the safety guidelines provided by the NSCA. The 7-point Likert scale used in this study used a numeric scale of 1-7, 1 representing strongly agree and 7 representing strongly disagree.

Results

Myths

The first part of the research question in this study examines the perception youth coaches have on the five myths presented by Faigenbaum (2010). This part of the study was answered by breaking up myth's 1, 2, 3 and 5 into three different age groups within the Tanner stages. The age groups used were 7-10 years of age, 11-14 years of age and 15-18 years of age. Myth 4 was not broken up into age groups because the statement was for youth athletes as a whole. Myth 4 had a mean of 6.34 and SD of .97. The following chart details the mean and SD of responses of each statement including myth 1, 2, 3 and 5 and the age groups.

Figure 2: Myth 1, 2, 3 and 5 Statistical Analysis



The following tables (tables 1-5) show the breakdown of each statement including the percentage and number of participants that selected each level of agreeance. It should be noted that there were 20 (32.26%) participants that selected neither agree nor disagree with "7-10 year old's cannot increase strength because they do not have enough testosterone." No participants agreed with myth #4 "Resistance training is only for youth athletes."

Table 1: Myth #1 Responses

Statement	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Resistance training can stunt the growth of 7-10 year old's	4 (6.45%)	9 (14.52%)	9 (14.52%)	9 (14.52%)	7 (11.29%)	17 (27.42%)	7 (11.29%)
Resistance training can stunt the growth of 11-14 year old's	1 (1.64%)	5 (8.20%)	6 (9.84%)	9 (14.75%)	9 (14.75%)	20 (32.79%)	11 (18.03%)
Resistance training can stunt the growth of 15-18 year old's	0 (0.00%)	0 (0.00%)	1 (1.64%)	3 (4.92%)	2 (3.28%)	29 (47.54%)	26 (42.62%)

Table 2: Myth 2 Responses

Statement	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Resistance training is unsafe for 7-10 year old's	5 (8.06%)	8 (12.90%)	12 (19.35%)	4 (6.45%)	9 (14.52%)	17 (27.42%)	7 (11.29%)
Resistance training is unsafe for 11-14 year old's	2 (3.23%)	4 (6.45%)	4 (6.45%)	4 (6.45%)	15 (24.19%)	20 (32.26%)	13 (20.97%)
Resistance training is unsafe for 15-18 year old's	0 (0.00%)	1 (1.61%)	2 (3.23%)	1 (1.61%)	4 (6.45%)	24 (38.71%)	30 (48.39%)

Table 3: Myth #3 Responses

Statement	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
7-10 year old's cannot increase strength because they do not have enough testosterone	0 (0.00%)	1 (1.61%)	4 (6.45%)	20 (32.26%)	12 (19.35%)	19 (30.65%)	6 (9.68%)
11-14 year old's cannot increase strength because they do not have enough testosterone	0 (0.00%)	2 (3.23%)	3 (4.84%)	7 (11.29%)	11 (17.74%)	26 (41.94%)	13 (20.97%)
15-18 year old's cannot increase strength because they do not have enough testosterone	0 (0.00%)	0 (0.00%)	0 (0.00%)	4 (6.45%)	6 (9.68%)	18 (29.03%)	34 (54.84%)

Table 4: Myth #4 Responses

Statement	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Resistance training is only for youth athletes	0 (0.00%)	0 (0.00%)	0 (0.00%)	7 (11.48%)	1 (1.64%)	17 (27.87%)	36 (59.02%)

Table 5: Myth #5 Responses

Statement	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
The sport of weightlifting is inappropriate for 7-10 year old's	13 (20.97%)	14 (22.58%)	13 (20.97%)	4 (6.45%)	10 (16.13%)	4 (6.45%)	4 (6.45%)
The sport of weightlifting is inappropriate for 11-14 year old's	5 (8.06%)	7 (11.29%)	10 (16.13%)	8 (12.90%)	13 (20.97%)	14 (22.58%)	5 (8.06%)
The sport of weightlifting is inappropriate for 15-18 year old's	1 (1.64%)	1 (1.64%)	1 (1.64%)	3 (4.92%)	9 (14.75%)	18 (29.51%)	28 (45.90%)

NSCA Guidelines

The second part of the research question addresses the guidelines set forth by the NSCA (table 6-7). To answer this question, each guideline was listed and participants chose from strongly agree to strongly disagree. Minimum was 1 for all guidelines but maximum did not reach 7 for any guideline. The standard deviation for "Should have an exercise environment that is safe and free of hazards" was a .40. "Perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises" had the highest mean of 2.44 and a SD of 1.35. Six (9.68%) participants selected neither agree nor disagree for this guideline. According to the table (table 6) below, all participants either selected somewhat agree, agree, or strongly agree for "Should have an exercise environment that is safe and free of hazards" and "Should optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep." Three participants disagreed that "qualified instruction and qualified supervision" should be present during resistance training. The results show that 96% of the participants with strength and conditioning training agree with all of the guidelines. However, only 82% of the participants without strength and conditioning training agree with all of the guidelines. In addition, more than 80% of the participants strongly agreed, agreed or somewhat agreed with each of the guidelines. The table (table 6) below shows how many participants selected which level of agreeance.

Table 6: NSCA Guidelines Responses

Guideline	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Should have qualified instruction and qualified supervision at all times	41 (66.13%)	15 (24.19%)	3 (4.84%)	0 (0.00%)	2 (3.23%)	1 (1.61%)	0 (0.00%)
Should have a exercise environment that is safe and free of hazards	50 (80.65%)	12 (19.35%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Support and encouragement from instructors and parents will help maintain interest	43 (69.35%)	16 (25.81%)	0 (0.00%)	1 (1.61%)	1 (1.61%)	1 (1.61%)	0 (0.00%)
Should start each training session with a 5- to 10-minute dynamic warm-up period	42 (67.74%)	17 (27.42%)	1 (1.61%)	2 (3.23%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Should begin with relatively light loads and always focus on the correct exercise technique	44 (70.97%)	15 (24.19%)	0 (0.00%)	2 (3.23%)	1 (1.61%)	0 (0.00%)	0 (0.00%)
Should perform 1–3 sets of 6–15 repetitions on a variety of upper- and lower-body strength exercises	22 (36.07%)	26 (42.62%)	8 (13.11%)	2 (3.28%)	3 (4.92%)	0 (0.00%)	0 (0.00%)
Should include specific exercises that strengthen the abdominal and lower back region	28 (45.16%)	24 (38.71%)	5 (8.06%)	2 (3.23%)	2 (3.23%)	1 (1.61%)	0 (0.00%)
Should perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises	16 (25.81%)	24 (38.71%)	10 (16.13%)	6 (9.68%)	3 (4.84%)	3 (4.84%)	0 (0.00%)
Should sensibly progress the training program depending on needs, goals, and abilities	40 (64.52%)	20 (32.26%)	1 (1.61%)	0 (0.00%)	1 (1.61%)	0 (0.00%)	0 (0.00%)
Should increase the resistance gradually (5–10%) as strength improves	24 (38.71%)	29 (46.77%)	5 (8.06%)	2 (3.23%)	2 (3.23%)	0 (0.00%)	0 (0.00%)
Should cool-down with less intense calisthenics and static stretching	29 (46.77%)	28 (45.16%)	2 (3.23%)	2 (3.23%)	1 (1.61%)	0 (0.00%)	0 (0.00%)
Should begin resistance training 2–3 times per week on nonconsecutive days	19 (30.65%)	28 (45.16%)	10 (16.13%)	2 (3.23%)	3 (4.84%)	0 (0.00%)	0 (0.00%)
Should use individualized workout logs to monitor progress	29 (46.77%)	23 (37.10%)	7 (11.29%)	2 (3.23%)	0 (0.00%)	1 (1.61%)	0 (0.00%)
Should optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep	48 (77.42%)	12 (19.35%)	2 (3.23%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Table 7: NSCA Guidelines Statistical Analysis

Guideline	Minimum	Maximum	Mean	Std Deviation	Variance
Should have qualified instruction and qualified supervision at all times	1.00	6.00	1.55	1.03	1.05
Should have a exercise environment that is safe and free of hazards	1.00	2.00	1.19	0.40	0.16
Support and encouragement from instructors and parents will help maintain interest	1.00	6.00	1.45	0.93	0.86
Should start each training session with a 5- to 10-minute dynamic warm-up period	1.00	4.00	1.40	0.68	0.47
Should begin with relatively light loads and always focus on the correct exercise technique	1.00	5.00	1.40	0.79	0.63
Should perform 1–3 sets of 6–15 repetitions on a variety of upper- and lower-body strength exercises	1.00	5.00	1.98	1.03	1.07
Should include specific exercises that strengthen the abdominal and lower back region	1.00	6.00	1.85	1.09	1.19
Should perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises	1.00	6.00	2.44	1.35	1.83
Should sensibly progress the training program depending on needs, goals, and abilities	1.00	5.00	1.42	0.69	0.47
Should increase the resistance gradually (5–10%) as strength improves	1.00	5.00	1.85	0.93	0.87
Should cool-down with less intense calisthenics and static stretching	1.00	5.00	1.68	0.82	0.67
Should begin resistance training 2–3 times per week on nonconsecutive days	1.00	5.00	2.06	1.01	1.03
Should use individualized workout logs to monitor progress	1.00	6.00	1.77	0.96	0.92
Should optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep	1.00	3.00	1.26	0.51	0.26

This table above depicts the minimum, maximum, mean, standard deviation and variance on the NSCA guidelines used in this study.

Discussion

This study aimed to examine the coaches' perceptions of youth resistance training and the knowledge and agreeance on the guidelines created by the NSCA. The author hypothesized that participants would believe the myths to be true more for the 7-10 year olds and 11-14 year olds than the 15-18 year olds. This hypothesis is supported by all five myths. The results indicate that there is a positive correlation with the myths and age groups. Simply put, as the age increases, the more likely the participant disagrees with the statement. Figure 2 shows that the myths' means are closer to 7 (Strongly disagree) as the age increases. This means the average person in this study disagreed or strongly disagreed when it came to ages 15-18. This shows that coaches are not on the same page as the existing literature. Since the release of the myths in 2010, there has been a large amount of research concluding that resistance training can be beneficial for all youth.

One statement that the participants agreed on was that resistance training is not just for the youth athletes. Our youth coaches understand that collegiate professionals and other adults can benefit from resistance training. However, according to the data in this study, coaches still have a negative perception of youth resistance training. All youth, 7-18 year olds should be participating in a safe and appropriate resistance training program. If implemented correctly, the benefits that all youth athletes could gain from resistance training includes not only, "muscular strength, power, and muscular endurance, [but] regular participation in a youth resistance training program has the potential to influence many health- and fitness related measures" (Baechle & Earle, p. 147, 2008).

The author also hypothesized that at least 80% of the participants in this study will agree with each individual guideline. The data collected supports this hypothesis by showing that over 90% of the participants either selected strongly agree, agree or somewhat agree on thirteen out of fourteen of the responses. According to the NSCA's, position statement on youth resistance training,

> the program variables that should be considered when designing a youth resistance training program include (a) warm-up and cool-down, (b) choice and order of exercise, (c) training intensity and volume, (d) rest intervals between sets and exercises, (e) repetition velocity, (f) training frequency, and (g) program variation" (Faigenbaum et al., p. S69, 2009).

The professionals that created the guidelines ensured that each guideline covers these important factors. With many of the participants of this study agreeing with the guidelines, we can assume that the coaches' in this study see the value of the factors listed in the position statement. The perceptions of the coaches in this study show that our coaches are becoming more educated and are potentially providing our young participants with safe resistance training programs.

The only guideline that had less than 90% agreement rate but above the hypothesized 80% is "perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises." This guideline is one of the most specific statement of all fourteen because it includes the training intensity, volume, and body parts. Specifically, this guideline had the highest "neither agree nor disagree" response rate than any other guideline. From this information, we can assume that our coaches in this study were more hesitant to agree with the statement due to the specificity and lack of understanding. These general youth resistance training guidelines were

put in place by professionals within the NSCA to ensure no youth athlete puts themselves at risk. These guidelines are a starting point for any youth resistance training program. As professionals and individuals implementing the programs, it is key to remember that the participating children are not miniature adults. The youth athletes should be following the guidelines put in place but also keeping up on existing literature to learn ways to safely progress through the programs.

A conclusion that we can make from this study is that there is a direct impact on the myths presented and the NSCA guidelines. Even though the majority of participants agreed with the guidelines, there were still participants who did not. In addition, from examining the means and standard deviations of the myth section of the survey, the responses varied. This means that the participants were not able to find common ground. If an individual believes that resistance training is unsafe for 7-14 year olds, then they are less likely to implement a program for them, as well as agree with some of the guidelines. If the NSCA youth resistance training guidelines were known, accepted and implemented throughout the community, individuals may not believe the myths to be true. The findings from this study can add to the existing literature showing that there is still a gap between the perceptions of youth coaches' and the existing literature. Even though this topic has been making progress, there is still a need for more investigation. Further research needs to be conducted in order to find the source of the misunderstanding of youth resistance training. Further research may allow our youth athletes to become better and healthier.

Limitations

This research study adds to the existing literature about youth resistance training. The results of this study address many different avenues for future research. However, there were a few limitations to note. These limitations possibly had an effect on the analysis of the data

collected and the way the findings were interpreted. A limitation that was prevalent was how small the sample size collected was. Ideally, a response rate greater than 11% would have made this study more applicable. Unfortunately, because of the time constraints, the survey had to be closed for the author to begin data collection. This limitation made identifying significant relationships from the data difficult. Another limitation was the lack of research examining Faigenbaum's five myths. No other study had investigated the relevance of the five myths when it came to youth coaches. As a result, there was an inability to compare the results to other research.

The last limitation noted was using the age of 18 in the study. According to Zwolski, Quatman-Yates, and Paterno (2017), age 18 can be considered an adolescent. This specific article is how the author of this study came up with the age groups. However, including age 18 may elicit different perceptions from coaches. According to society, 18 year olds are considered adults, which could have altered the way participants viewed the 15-18 age group compared to the 7-10 and 11-14 groups. Further research could avoid the first limitation by sending out the recruitment email to a larger sample size, sending more reminder emails, and giving the participants more time to complete. The second limitation shows the need for further research on how coaches perceive youth resistance training and on Faigenbaum's research. Lastly, further research can address the definition of youth athletes and educate individuals on the ages performing resistance training.

Conclusion

The history of resistance training created a bad reputation and has created this negative connotation. The myths have been connected to resistance training for decades now. To recap,

there were five main myths connected to youth resistance training. The myths included resistance training is unsafe, it will stunt young athlete's growth, they will not gain strength because of their low level of testosterone, it is only for youth athletes, and weightlifting is inappropriate for youth athletes. In the past 25 years, there has been a good amount of literature that positively correlates with these myths. Nevertheless, a large amount of research within the last ten years does not correlate with these myths and have proven otherwise. Faigenbaum, along with other devoted researchers sought out to persuade parents and coaches at all levels of youth athletes to implement a resistance training program. According to a recent article conducted in 2018 by Faigenbaum states, "original research and reviews published in 2017 conclude that early exposure to developmentally appropriate resistance training can improve markers of health, increase muscular fitness, enhance physical literacy, and reduce the risk of injury in young athletes" (p. 19). Yet, parents, coaches and even health care professionals are still not implementing resistance training in youth athletes as much as they should.

As an athletic trainer (AT), it is important to know the benefits and risks associated with any type of strength and conditioning method. AT's are working closely with young athletes and many times are with them one on one. AT's have the platform to make sure the proper program is implemented. Many times the rapport that AT's have with parents can help influence the parents and young athletes' decision on implementing a resistance training program. Parents are constantly approaching AT's with the mindset of resistance training is bad and unsafe for their young athletes. Not only do AT's have influence over parents but also can educate coaches on proper guidelines to follow in order to create a successful and safe training environment. It is important that AT's are knowledgeable enough to be able to put an end to the myths with

evidence-based research. Professionals working in the field should be able to implement a resistance training program that is safe and free of risks. AT's, coaches and strength and conditioning coaches are in the most influential position to lay down the foundation. To be able to achieve this, professionals need to have the knowledge base in order to provide children and adolescents with potential benefits of resistance training.

Consistently, researchers are showing how the benefits of resistance training can overpower the risks. Therefore, the research can steer away from how effective resistance training is on youth athletes, and instead, the research should examine a different direction. Further research needs to look at why coaches, specifically high school coaches are not implementing resistance training into children and adolescent's routines. The purpose of this research study and literature review is to provide readers with a better understanding of youth resistance training and to prove that the myths are false. With the proper and age-appropriate guidelines easily accessible to the public, there should be minimal to no risk. This study found that coaches may have different views on youth resistance training. However, the majority of participants agreed with the NSCA's guidelines. Identifying the percentage of youth coaches that still believe in these myths, can help spread the education of this topic and give professionals a better understanding. A new possible directional research study is to examine coaches who are in their late 50s to 60s. These older coaches have lived through the era where resistance training was seen as negative when it came to youth athletes. The older generation might still believe that resistance training is bad for young athletes. Performing these types of studies can allow education of this topic to take place, as well as the more and safe implementation of resistance training.

Appendix A

Questionnaire

Q1 Informed Consent

Q2 What is your age range?

- 18-22 years old
- 23-27 years old
- 28-32 years old
- 33-37 years old
- 38-42 years old
- 43-47 years old
- 48-52 years old
- 53-57 years old
- 58-62 years old
- 63-67 years old
- 68-72 years old
- 73-77 years old
- 78-82 years old
- 83 years old +

Q3 What is your sex?

- Male
- Female

Q4 Please specify your ethnicity.

- White
- Hispanic or Latino
- American Indian or Alaska Native
- Black or African American
- Asian or Pacific Islander
- Other

Q5 What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.*

- o No schooling completed
- o Nursery school to 8th grade
- o Some high school, no diploma
- o High school graduate, diploma or the equivalent (for example: GED)
- o Trade/technical/vocational training
- o Associate degree
- o Bachelor's degree
- o Master's degree
- o Professional degree
- o Doctorate degree

Q6 Have you had any special training in the strength and conditioning area?

- o Yes
- o No
- o Unsure

Q7 Please specify your position.

- o Paid head coach
- o Unpaid head coach
- o Paid assistant coach
- o Unpaid assistant coach

Q8 Are you considered a full time or part time coach?

- o Full time
- o Part time

Q9 How long have you been a youth (7-18 years old) coach?

- o Less than 1 year
- o 1-5 years
- o 6-10 years
- o 11-15 years
- o 16-20 years
- o 21 or more years

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES
Q10 What sport(s) do you coach? Click all that apply.

- Girls basketball
- Boys basketball
- Wrestling
- Football
- Girls soccer
- Boys soccer
- Girls tennis
- Boys tennis
- Volleyball
- Girls lacrosse
- Boys lacrosse
- Coed swimming
- Baseball
- Softball
- Coed track and field
- Girls hockey
- Boys hockey
- Dance
- Coed cross country
- Cheerleading
- Rowing
- Other

Q11 Resistance training in this study is defined as a movement that involves the muscles to contract against an external force. This includes, weight machines, free weights, elastic bands, medicine balls, and/or plyometrics. Youth, adolescent and children in this study are referred to as 7- 18 year old's.

Please rate each statement as best as you can.

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
Resistance training can stunt the growth of 7-10 year old's. (1)	○	○	○	○	○	○	○
Resistance training can stunt the growth of 11-14 year old's. (2)	○	○	○	○	○	○	○
Resistance training can stunt the growth of 15-18 year old's. (3)	○	○	○	○	○	○	○

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

Q12 Please rate each statement as best as you can.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
Resistance training is unsafe for 7-10 year old's. (1)	○	○	○	○	○	○	○
Resistance training is unsafe for 11-14 year old's. (2)	○	○	○	○	○	○	○
Resistance training is unsafe for 15-18 year old's. (3)	○	○	○	○	○	○	○

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

Q13 Please rate each statement as best as you can.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
7-10 year old's cannot increase strength because they do not have enough testosterone. (1)	○	○	○	○	○	○	○
11-14 year old's cannot increase strength because they do not have enough testosterone. (2)	○	○	○	○	○	○	○
15-18 year old's cannot increase strength because they do not have enough testosterone. (3)	○	○	○	○	○	○	○

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

Q14 Please rate each statement as best as you can.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
Resistance training is only for youth athletes. (1)	○	○	○	○	○	○	○

Q15 Please rate each statement as best as you can.

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
The sport of weightlifting is inappropriate for 7-10 year old's. (1)	○	○	○	○	○	○	○
The sport of weightlifting is inappropriate for 11-14 year old's. (2)	○	○	○	○	○	○	○
The sport of weightlifting is inappropriate for 15-18 year old's. (3)	○	○	○	○	○	○	○

Q16 All youth (7-18 years old) athletes performing resistance training...

COACHES' PERCEPTIONS OF YOUTH RESISTANCE TRAINING AND COMMON PRACTICES

	Strongly agree (1)	Agree (2)	Somewhat agree (3)	Neither agree nor disagree (4)	Somewhat disagree (5)	Disagree (6)	Strongly disagree (7)
Should have qualified instruction and qualified supervision at all times (1)	○	○	○	○	○	○	○
Should have a exercise environment that is safe and free of hazards (2)	○	○	○	○	○	○	○
Support and encouragement from instructors and parents will help maintain interest (3)	○	○	○	○	○	○	○
Should start each training session with a 5- to 10-minute dynamic warm-up period (4)	○	○	○	○	○	○	○
Should begin with relatively light loads and always focus on the correct exercise technique (5)	○	○	○	○	○	○	○

Should perform 1–3 sets of 6–15 repetitions on a variety of upper- and lower-body strength exercises (6)	○	○	○	○	○	○	○
Should include specific exercises that strengthen the abdominal and lower back region (7)	○	○	○	○	○	○	○
Should perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises (8)	○	○	○	○	○	○	○
Should sensibly progress the training program depending on needs, goals, and abilities (9)	○	○	○	○	○	○	○
Should increase the resistance gradually (5–10%) as strength improves (10)	○	○	○	○	○	○	○

Should cool-down with less intense calisthenics and static stretching (11)	○	○	○	○	○	○	○
Should begin resistance training 2–3 times per week on nonconsecutive days (12)	○	○	○	○	○	○	○
Should use individualized workout logs to monitor progress (13)	○	○	○	○	○	○	○
Should optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep (14)	○	○	○	○	○	○	○

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